

# Closure of Oroantral Communication Using Platelet-rich Fibrin: A Report of Two Cases

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## Abstract

Oroantral communication (OAC) is an abnormal connection between the maxillary sinus and oral cavity. It is mostly formed after the extraction of the first and second upper molars. Platelet-rich fibrin (PRF) created by Choukroun's protocol concentrates most platelets and leukocytes from a blood harvest to a single autologous fibrin biomaterial. It has been used widely in oral and maxillofacial surgery. However, no data are available concerning the use of PRF alone as a clot and a membrane for the closure of OACs. Two clinical cases presented with OAC, created after extraction of tooth #16 in two patients, were closed with PRF as a clot and a membrane and monitored until the epithelization of the sockets was ended successfully. Two months postclosure, the sockets were evaluated clinically and on waters' view radiography. The results of these case reports showed that PRF can be successfully applied for the closure of OACs.

**Keywords:** Oroantral communications, platelet-rich fibrin, postextraction complications

## INTRODUCTION

The maxillary sinus takes up a large part of the body of the maxilla, generally extending into the alveolar process bordering the apices of the posterior teeth. Oroantral communication (OAC) is an open connection between the oral cavity and maxillary sinus usually caused by extraction of maxillary posterior teeth.<sup>[1]</sup> The incidence of the formation of OAC is 1:180 extractions of the upper first molar and 1:280 extractions of the upper second molar.<sup>[2]</sup> Currently, the most common techniques used for closure of OACs are performed by surgical procedures.<sup>[3]</sup>

Platelet-rich fibrin (PRF) is a second-generation platelet concentrate defined as an autologous leukocyte and PRF biomaterial. It was first developed by Choukroun *et al.* and has been used extensively in combination with bone graft materials for periodontal regeneration, ridge augmentation, sinus lift procedures for implant placement, and for coverage of recession defects in the form of a membrane. This membrane consists of a fibrin three-dimensional polymerized matrix in a molecular structure with the incorporation of some blood contents, such as platelets, leukocytes, growth factors, and circulating stem cells.<sup>[4,5]</sup>

The PRF clot forms a strong natural fibrin matrix, which concentrates almost all the platelets and leukocytes of the blood harvest and creates a complex architecture as a healing matrix, including mechanical properties no other platelet concentrate offers. It is an autologous biomaterial rather than a fibrin glue.<sup>[5]</sup>

Recently, it has been reported that PRF could stimulate cell proliferation of osteoblasts, gingival fibroblasts, pulp cells, and periodontal ligament cells but suppress oral epithelial cell growth.<sup>[6]</sup> These cell-type-specific actions of PRF may be beneficial for tissue regeneration. Some clinical applications in socket preservation, sinus augmentation, and periodontal regeneration surgery have been described previously.<sup>[7]</sup> Gülsen *et al.* found that PRF as clot only can close OAC.<sup>[8]</sup> However, to the best of our knowledge, no data are available in the use of PRF alone as a clot and a membrane for the closure of OAC without any other conjunction materials. The aim of this case

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series report is to describe two cases of OAC that were closed using PRF as a membrane and a clot.

## CASE REPORT

Two patients (29-year-old male and 44-year-old female) attended the Department of Oral and Maxillofacial Surgery at Faculty of Dentistry, Tishreen University complaining with discomfort and air blowing from the right side of the upper molar region with some alteration in the vocal resonance.

### Clinical and radiographic examination

The affected sites were examined firstly by visual inspection. There was freshly extraction for teeth #16 (for the two patients) with large open socket exposed to the oral cavity. No bone fracture or gum lacerations were found. Another clinical examination was then performed by Valsalva test (asking the patient to blow the air gently through his nose while his nostrils are pinched). Air blow was clear through the extraction sites. A waters' view radiography was taken and another periapical X-ray, with a cone of gutta-percha inserted gently in the extraction site, was also taken to confirm the diagnosis [Figure 1]. The clinical and radiographic examination revealed OAC resulted from teeth extraction. The patients were free from any systemic or local condition that may interfere with the proposed treatment.

### Clinical procedures and outcomes

Both sites were prepared by irrigation with a sterile physiological saline to eliminate any residue or contaminations. PRF was then prepared by taking blood samples into 12 ml glass-coated plastic tubes without anticoagulant. The samples were centrifuged immediately at 3000 rpm for 10 min. A fibrin clot was formed in the middle part of the tube while the upper part contained acellular plasma, and at the bottom, there were the red corpuscles. The fibrin clot was separated easily and one-third was cut off and inserted gently into the extraction socket [Figure 2]. The remaining two-third of the clot was pressed gently with sterile dry gauze to drive out the fluids and forming the membrane [Figure 3]. The extraction site was covered with the membrane which was sutured to the gingival

margins with two suture knots using 4/0 silk nonresorbable sutures [Figure 4]. Mouthwash and analgesics were prescribed postoperatively for 2–3 times daily for 1 week. Instructions were given to the patients not to eat hard foods and to avoid blowing the nose. Sutures were removed 10 days later.

### Follow-up

Patients were followed up clinically after 48 and 72 h and then after 1, 4, and 8 weeks postoperatively. There was no inflammatory reaction, signs, or symptoms of maxillary sinusitis, and the healing process was obviously clear [Figure 5]. Another waters' view radiography was taken after 8 weeks postoperatively. No signs of discontinuing on the lamina of the sinus were seen.

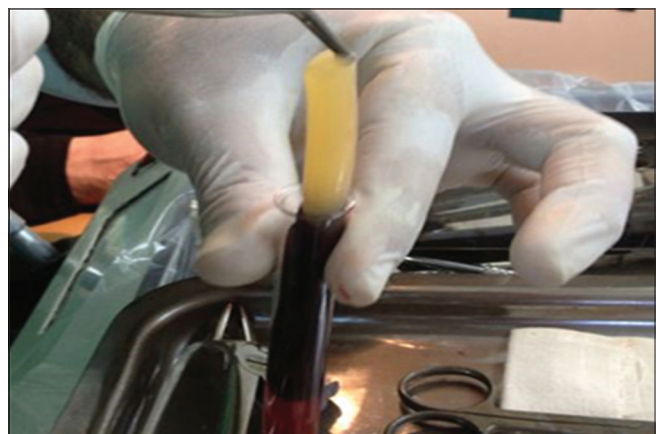
## DISCUSSION

PRF is prepared naturally using Choukroun's technique without the addition of thrombin. It is hypothesized that the PRF has a natural fibrin framework that can protect growth factors from proteolysis.<sup>[9]</sup> PRF can be considered as a natural fibrin-based biomaterial to guide cell migration into the wound. In addition, growth factors are active for a relatively longer period and are effective in stimulating tissue regeneration. This led to the idea of using PRF as a biomaterial for closure of OAC.

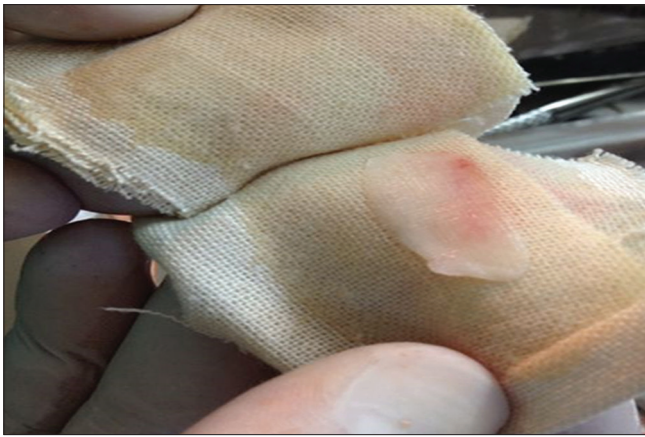
To the best of our knowledge, this is the first report of the use of PRF individually as itself for closure of OACs. Recall examinations of the patients who received the procedures showed complete closure and absence of any maxillary sinus pathoses. The reason that the PRF can improve the OAC healing can be explained as the fibrin matrix can guide the healing processes. Recently, it has been found that PRF can upregulate phosphorylated extracellular signal-regulated protein kinase expression and suppresses osteoclastogenesis by promoting the secretion of osteoprotegerin (OPG) in osteoblasts cultures.<sup>[10]</sup> PRF was also demonstrated to stimulate osteogenic differentiation of human dental pulp cells and periodontal ligament cells by upregulating OPG and alkaline phosphatase expression.<sup>[7]</sup>



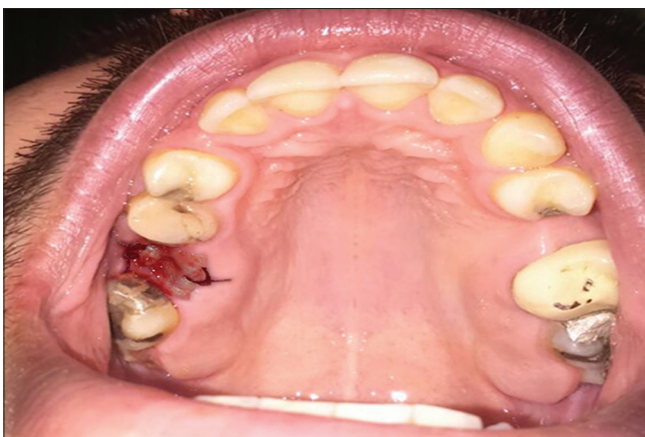
**Figure 1:** Periapical X-ray with gutta-percha through the sinus



**Figure 2:** Separating the platelet-rich fibrin



**Figure 3:** Forming platelet-rich fibrin membrane



**Figure 4:** Suturing of the platelet-rich fibrin membrane



**Figure 5:** Eight weeks after oroantral communication closure

Many growth factors, such as platelet-derived growth factor and transforming growth factor, are released from the PRF.<sup>[4]</sup> In addition, PRF may play an important role in the revascularization of the graft by supporting angiogenesis.

Taking all of these into consideration, PRF can be recognized as an autologous biomaterial. PRF as a membrane and grafting

material offers an improved space-making effect on the barrier, which is conducive to cell events leading to bone tissue regeneration and facilitation of mineralized tissue formation due to osteoconductive and/or osteoinductive properties possibly inherent in PRF.

## CONCLUSION

PRF through Choukroun's technique is a simple and inexpensive procedure. The use of this biomaterial for the closure of OAC seems to be a very promising option.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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